

NIMO - Development and demonstration of a novel integrated condition monitoring system for wind turbines

Wind energy is currently the most developed of a number of renewable energy technologies, with several thousands of wind turbines either already operating or being planned for construction across Europe. Wind turbines can be deployed individually to power a single site or installation, but are most commonly grouped together as wind farms to provide power to the electricity grid.



The energy output from wind turbines has increased dramatically over the past thirty years from 50kW to 6MW, while 8-12MW turbines are in the design stage. The greater energy yield achieved means that the number of turbines needed to produce a given amount of energy has been reduced by a significant factor. Over the same period, however, the tower height and rotor diameter of turbines have doubled, leading to much more complex construction, maintenance and inspection procedures, particularly when off-shore wind turbines are concerned.

The EU has set new growth targets for the wind power generation industry as part of the plan for the decarbonisation of the European economy during the next few decades through the increasing utilisation of renewable sources of energy.

Reliability aspects of wind power generation have always been a fundamental obstacle in consolidating industrial and societal confidence in wind energy's potential to replace conventional power sources. At the moment wind turbine manufacturers and

operators are faced with substantial operational costs largely due to the amount of corrective maintenance that needs to be carried out every year resulting from the unexpected failure of various critical turbine components. The ever rising number of the wind turbines themselves increases the likelihood of a failure and makes efficient maintenance planning more and more difficult due to the lack of qualified maintenance personnel and the limited financial resources available to wind farm operators.

Project objective

Under normal operation schedules wind turbines have an average annual maintenance expenditure of around 2% of the original turbine investment. However, unpredictable failure of certain wind turbine components, such as turbine blades, tower, gearbox, generator, braking system, yaw system, etc., can lead to substantially higher maintenance costs and reduced availability of wind turbines. To increase the competitiveness of wind energy in comparison to other power generation technologies, significant and measurable improvements in the availability, reliability and lifetime of wind turbines need to be achieved in the foreseeable future.

NIMO seeks to largely eliminate catastrophic failures and minimise the need for corrective maintenance by developing and successfully implementing an integrated condition monitoring system for the continuous evaluation of wind turbines. NIMO will advance existing state-of-the-art condition monitoring technology used in wind turbines by delivering an advanced system which will be able to reliably evaluate the condition of critical structural components, rotating parts and braking mechanisms.

For further information, please visit the project website at www.nimoproject.eu.

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